

A REVISION OF THE LACERTILIAN GENUS
TYMPANOCRYPTIS

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Plates iv-vi and text fig. 1-10.

INTRODUCTION.

An initial attempt has been made to deal as comprehensively as present knowledge and collections will allow with the agamoid genus, *Tympanocryptis*, the species of which have been the subject of considerable controversy. The author's original intention in examining as many specimens and attendant data as possible was to determine the status and variation of the disputed forms. Collections at present available, however, have proved insufficient, and, as is often the case in preliminary papers of this nature, material from many key localities is lacking. In consequence, no conclusive decisions have been reached on several problems.

This preliminary examination showed that additional taxonomic work was still necessary, for owing to the non-comprehensive approach and few specimens of previous authors, confusion had resulted over the identification and distribution of the Central Australian species. Consequently, all available data have been gathered in a survey of the genus, and as a result five species and three races including five new forms are here recognized.

These new forms are as follows:

TYMPANOCRYPTIS INTIMA sp. nov.

This species, which has previously been mistaken for *T. cephalus* Gunther, inhabits the Eyrean Basin.

TYMPANOCRYPTIS MACULOSA sp. nov.

This species, unique in the genus, because of the presence of femoral pores extending along the thigh, inhabits the barren salty surface of Lake Eyre North. Twenty specimens were taken by the late Dr. C. T. Madigan during his 1929 expedition to the Lake.

TYMPANOCRYPTIS UNIFORMIS sp. nov.

This unusual form has been erected tentatively as a species, its relatively uniform scalation contrasting sharply with the rugose scaling of the other species. Founded on a single specimen taken near Darwin, Northern Territory.

TYMPANOCRYPTIS LINEATA PINGUICOLLA subsp. nov.

A stout, short-limbed race inhabiting parts of Southern Victoria.

TYMPANOCRYPTIS CEPHALUS GIGAS subsp. nov.

This race appears to inhabit the upland area bounded by the Gascoyne and Fortescue Rivers, Western Australia.

After an examination of all four-pored specimens available, it has been decided to reinstate *tetraporphora* Lucas and Frost, as a race of *T. lineata* Peters,

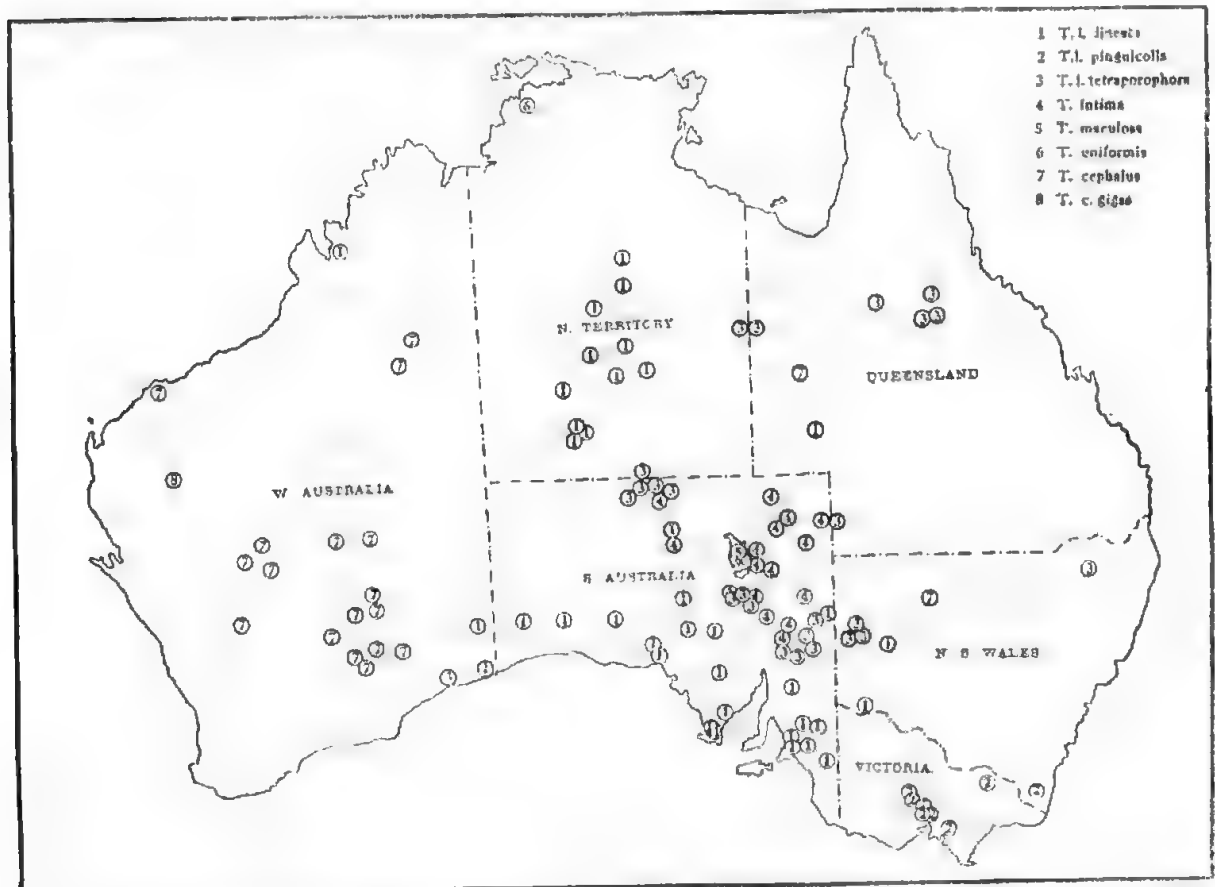


Fig. 1. Distribution map, showing the approximate localities at which recorded specimens have been taken.

although its status and position still remain doubtful. The description of *T. cephalus* Gunther has been amplified. Consideration of Sternfeld's reasons for the recognition of the race *centralis* has resulted in its being placed in the synonymy of *T. lineata lineata* Peters.

Many of the descriptive characters previously in use are common to more than one race and several generally neglected and seemingly trivial, but constant characters have been utilized herein in separating the various forms. The chief of

these minor features are the shapes of the dorsal tubercles, and the number of scales separating the nasal from the upper labials. In view of these additions to diagnoses, detailed redescriptions of the previously known species have been given for comparative purposes.

All relevant literature known to the author has been noted, and papers not otherwise referred to and present in the bibliography contain locality data.

Although all available material has been examined, extensive field work must be undertaken before an accurate conception of the status and evolution of the species in this unusually distributed genus can be formed. With the exception of the species in and around the Eyrean Basin, the extreme distribution lines cannot be plotted to an extent sufficient to determine the presence or absence of overlap, and consequently the author has been unable to verify the status of several forms.

It will be noted that in the locality and registration lists, South Australian Museum registration numbers refer to the locality of a collection, and not to any individual specimen, unless it be the only specimen in the collection. Where necessary, specimens are designated a, b, c, etc., under the collection registration number. In the above-mentioned lists the following abbreviations of Museum titles have been utilized: "B.M.," British Museum, London; "A.M.," Australian Museum, Sydney; "S.A.M.," South Australian Museum, Adelaide; "N.M.," National Museum, Melbourne; "W.A.M.," Western Australian Museum, Perth; and "M.M.," Macleay Museum, Sydney.

The head length as given is the distance from the tip of the snout to the gular fold, and the body length, the distance from the gular fold to the anus.

TYMPANOCRYPTIS Peters.

Tympanocryptis Peters, 1863, p. 320; Boulenger, 1885, p. 392; Lucas and Frost, 1896, p. 131.

In view of the discovery of a species possessing four to seven femoral pores, the generic redescription of Lucas and Frost (1896) must be further modified.

A modified generic description is as follows: Tympanum covered with scales, its position usually marked with a depression; body depressed, covered dorsally with heterogeneous scales; upper head scales small, asymmetrical; ventral scales uniform. A strong gular fold, but no gular sac; angle of the mouth and axilla-groin skin folds present or absent. Tail round or slightly depressed at the base. Femoral and/or preanal pores present, usually in both sexes¹.

¹ Critical microscopic examination is often required to find the pores in some female specimens.

KEY TO THE SPECIES AND SUBSPECIES OF *TYMPANOCRYPTIS*.

1. Femoral pores present	..	..	..	..	..	..	..	3
2. Femoral pores absent		..	..	..	..	..	..	5
3. Preanal pores present	..	..	..	..	..	..	..	15
4. Preanal pores absent	..	..	..	..	..	..	..	<i>muculosa</i>
5. Dorsal scales smooth	..	..	..	..	..	..	..	7
6. Dorsal scales keeled	..	..	..	..	..	..	..	11
7. Enlarged tubercles sparse, wider than long and tending to form four longitudinal series	..	..	..	..	..	..	..	<i>intima</i>
8. Enlarged tubercles and spines tending conical	..	..	..	..	..	..	..	9
9. Head short, deep, about as wide as long	..	..	..	..	..	..	..	<i>cephalus cephalus</i>
10. Head large, flat, wider than long	..	..	..	..	..	..	..	<i>cephalus gigas</i>
11. Enlarged scales flat with a simple central keel	..	..	..	..	..	..	..	<i>uniformis</i>
12. Enlarged scales raised and spinously tubercular	..	..	..	..	..	..	..	13
13. Enlarged tubercles with basal length longer than height	..	..	..	..	..	..	..	<i>lineata lineata</i>
14. Enlarged tubercles with basal length shorter than height	..	..	..	..	..	..	..	<i>lineata pinguicollis</i>
15. Two preanal and two femoral pores present	..	..	..	..	..	..	..	<i>lineata tetraporophora</i>

TYMPANOCRYPTIS INTIMA sp. nov.

Tympanocryptis cephalus (non Gunther) Lucas and Frost, 1896, p. 131; Zietz, 1917, p. 470; Kinghorn, 1945, p. 5.

Form stout; head longer than broad, covered with flat, smooth or slightly rugose scales, 11-14 occurring between the supraorbital ridges. Nostril oval, pierced in an enlarged nasal, which is separated from sixteen upper labials by five rows of scales. Nostril directed forward and downward, situated about midway between the eye and the tip of the snout. Body strongly depressed, covered dorsally and laterally with small, non-keeled, and not or but slightly imbricate scales; intermixed sparsely with enlarged spinous tubercles which tend to be disposed in four longitudinal series. These enlarged tubercles are wider than long with rounded anterior edges as figured. Limbs and tail short, the adpressed hind limb reaching to the shoulder; covered with feebly keeled scales intermixed on the thighs with enlarged mucronate tubercles. Ventral and gular scales smooth. Eighteen and ten spinous bicarinate lamellae under the fourth and third toes respectively. Preanal pores present, 1+1.

Colouration of the type. Ground colour light grey-brown with eight darker brown indefinite blotches, four on either side of the vertebral line. Dorsolateral lines absent. Twelve darker caudal cross-bands and a grey nape band are present. Ventral surfaces white.

General colouration. The ground colour varies from dull grey to brick red dependent on the locality; the quadrate spots are seldom present and if so merely

as indefinite blotches. There is no caudal banding in some specimens; ventral surfaces white or occasionally finely spotted with brown in the gular and chest regions of male specimens.

Measurements. Holotype female, S.A.M., R2331.

Total length: 123 mm.

Head width: 13 mm.

Body length: 41 mm.

Fore limb: 25 mm.

Tail length: 66 mm.

Hind limb: 38 mm.

Head length: 16 mm.

Distribution. This species inhabits the open gibber deserts and spinifex flats of the Eyrean Basin, to which area it is principally restricted occurring

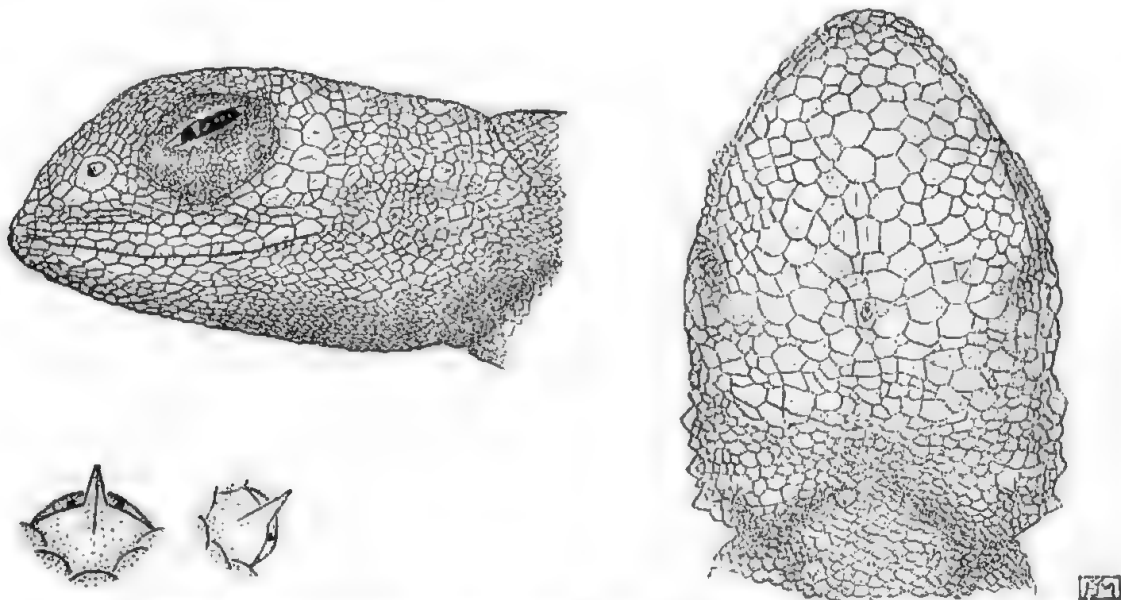


Fig. 2. *Tympanocryptis intima*: dorsal and lateral views of the head ($\times 3$) and an enlarged spinous tubercle ($\times 5$) of the holotype female.

right to the edge of Lake Eyre. It also appears to have encroached beyond this into the distributions of *lineata* and *lineata tetraporophora* along the southern, western and eastern extremities of its distribution.

Loc. South Australia: Oodnadatta (S.A.M. R2331, type); 20 miles north of Maemba Creek (S.A.M. R2444, part); Mt. Hopeless (S.A.M. R746); Marree (S.A.M. R2432, R2449); Innaminka (S.A.M. R744); Killalpaninna (S.A.M. R743); Clayton (S.A.M. R745); Strzeleeki Creek (S.A.M. R747); Leigh Creek (S.A.M. R2452); Lake Callabonna (S.A.M. R988); Finnis Springs (S.A.M. R2525, part); 4 miles south-west of Marree (S.A.M. R2597, part); Camp 49, Simpson Desert Expedition (A.M. R673); Central Australia (N.M.

R1164-R1178); South Australian Museum Expedition to Lake Eyre District (S.A.M. R748).

Also Camp 31, Goyder Lagoon, according to Kinghorn (1945).

This species, which often has been mistaken for *cephalus*, owing to the insufficient description of the last-named, can be distinguished easily from it by the sparse and singly distributed dorsal tubercles. The variation that occurs in this species is of little significance, the principal variant being the number and disposition of the tubercles. These are relatively few and tend to be disposed in four longitudinal series. In some specimens the aligning is almost perfect, while in others the tubercles are irregularly scattered over the dorsal surface. The tubercles of specimens taken near the edge of Lake Eyre are more flattened and non-spinous, although still retaining their serial disposition.

Although distinct and easily distinguishable this species does not at first appear worthy of full specific status, and was thought only a race. However, careful examination of collections and the compilation of distribution maps has led to the finding of definite and substantial overlap on the western, southern and eastern extremities of its distribution. Typical specimens of *intima* have been taken at several localities within the recorded ranges of *lineata* and *lineata tetraporophora*, and in one collection (S.A.M. R2597) typical *intima* and *lineata tetraporophora* are labelled as having been taken under the same stone. Similarly there is a single specimen of *intima* in a collection of *lineata tetraporophora* from "20 miles north of Macumba Creek, South Australia" (S.A.M.), and several other instances could be tabulated.

This evidence leaves little doubt that *intima* is biologically separate from the surrounding populations, and must therefore be granted full specific status.

TYMPANOCRYPTIS CEPHALUS Gunther.

Tympanocryptis cephalus Gunther, 1867, p. 52; Boulenger, 1885, p. 393, pl. xxxi, fig. 1; Stirling and Zietz, 1893, p. 168.

Tympanocryptis lineata cephalus Kinghorn, 1932, p. 360.

Form stout; head, deep with obtuse snout, slightly longer than broad. Tympanum depression indistinct in both sexes. Nostril oval, directed forward and downward; nasal enlarged and resting on an ill-defined canthus rostralis; separated from fifteen to seventeen upper labials by five to seven rows of scales. Upper head scales raised and rugose but not keeled, there being 13-16 between the supraciliary ridges and 6-9 separating the nasals. Body strongly depressed, covered with smooth heterogeneous scales; intermixed irregularly with raised, often tending conical tubercles which have a small keeled spine at the summit.

These tubercles occur in clumps of two, three or more adjacent, and are not singly distributed as in the other species. Ventral scales uniform and smooth. Tail and limbs short, the adpressed hind limb reaching to the shoulder in females and between it and the tympanum depression in males; tail strongly depressed at the base. A strong transverse gular fold present; angle of the mouth fold feebly present or absent; axilla-groin fold absent. Sixteen to eighteen and twelve spinous bicarinate lamellae under the fourth and third toes respectively. Preanal pores present, 1+1.

Colouration. Ground colour grey-brown to red-brown dorsally, lightening dorso-laterally to creamy-white ventrally. Tail with eight to ten very strong

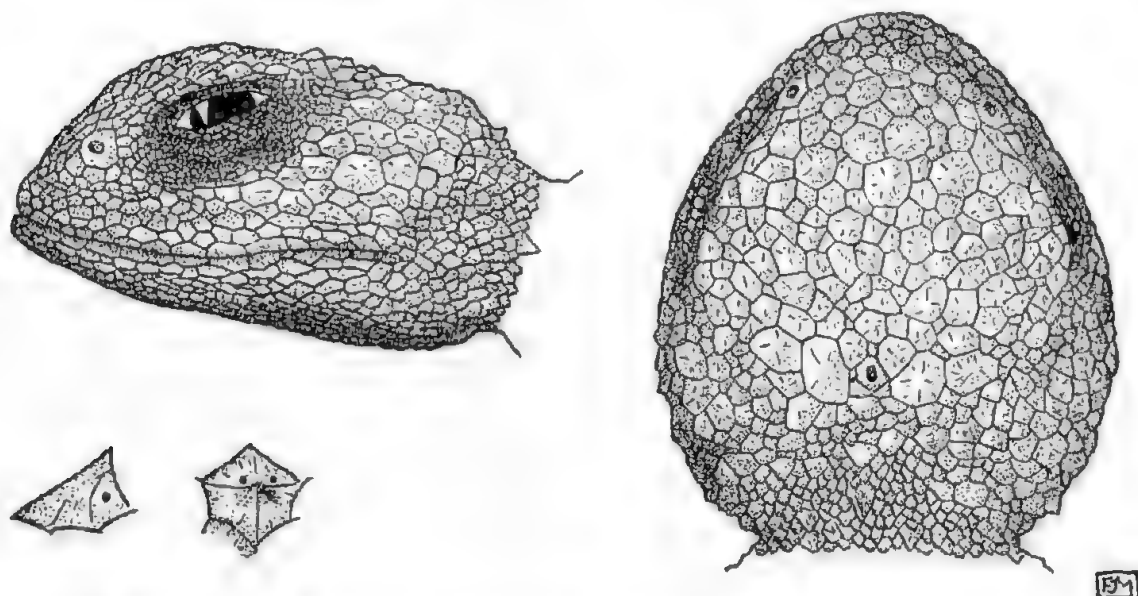


Fig. 3. *Tympanocryptis cephalus cephalus*: dorsal and lateral views of the head ($\times 3$) and an enlarged dorsal tubercle ($\times 5$) of a typical male specimen—W.A.M. R7067.

black cross-bands which generally extend right around the tail and not just dorsally as with the other species. The first curved tail band is very prominent. A dark brown nape band is present in many specimens. There are no quadrate spots or bands on the body. The ventral surfaces of some male specimens are faintly spotted with brown.

Measurements. W.A.M., R6755, female.

Total length: 116 mm.

Body length: 38 mm.

Tail length: 60 mm.

Head length: 18 mm.

Head width: 15 mm.

Fore limb: 26 mm.

Hind limb: 35 mm.

Distribution. This species has been taken over the greater part of the Western Australian Shield. Kinghorn (1932) described a specimen from

Ardmore, in north-western Queensland. This specimen (A.M. R10307) has been examined and found to be recognizable although not typical *cephalus*. Similarly a specimen from Tilpa, New South Wales (A.M. R11082) also has definite affinities with *cephalus*. Both of these specimens have 5-7 scales separating the nasal from the upper labials, and typical *cephalus* colouration. The tubercles, however, are less rugose with a central keel terminating in a small spine. In the Ardmore specimen these tubercles are raised and clumped as in typical *cephalus*, although for the most part singly distributed in the Tilpa specimen.

Loc. Western Australia: Nicol Bay (British Museum co-type); Murchison Goldfield (S.A.M. R2437); Murchison District (S.A.M. R2439, W.A.M. R2001); Broad Arrow (S.A.M. R2422); Laverton (W.A.M. R1757, R1499, R1242, R1758, R1360, R1305, A.M. R3370); Kurrawang (W.A.M. R6755, R6434, R6754, R6435); Meekathara (W.A.M. R2006); Kalgoorlie (W.A.M. R6543, R4329, R6542, R6544); Lake Wells District (W.A.M. R1606); Grant Patch (W.A.M. R7076); Bulong (W.A.M. R3748); Canning Stock Route (40-43), (W.A.M. R3990); Wiluna (W.A.M. R7302); Londonderry (W.A.M. R2346); Western Australia (A.M. R6243). Queensland: Ardmore (A.M. R10307-12). New South Wales: Tilpa (A.M. R11082).

The above description, although agreeing in essentials, differs in detail from Gunther's type description. Photographs and data kindly supplied by the British Museum support the accuracy of Gunther's short description (1867) and Boulenger's figure (1885), but demonstrate that the specimens in this, the only coastal collection so far made differ in sculation detail from inland specimens. It has been suggested by a fellow worker that this inland form should be described as a new race. However, after considering that no similar specimens have been taken, it is assumed that the type specimens are merely local variants, and not typical representatives of the species which Gunther in fact described.

In view of this, specimens agreeing with the above description are regarded tentatively as typical of the species. It is apparent from Boulenger's figure and the British Museum photograph of a co-type that these agree basically with inland specimens.

Another interesting factor, previously noticed by Kinghorn (1932) is the form and number of scales separating the nasals. The transverse head scale count generally used, and applied in this paper is that between the supra-iliary ridges. It can be seen that these counts are approximately equal in all species. The rugose head shields of *cephalus* are undoubtedly larger than those of the other species relative to the head dimensions, the short snout and yet wide head of *cephalus* accounting for the similar transverse supra-iliary counts. Dealing with a larger number of specimens, the count between the nostrils has not been found as consistent as Kinghorn apparently found it, although a definite division between the average

numbers is apparent. In an examination of all specimens available the following averages have been found: *cephalus*, 7.7, range 6–9; *lineata* 10.4, range 8–13.

Although the existence of this species has been verified by several authors its status has always remained doubtful. Present evidence lends little assistance in solving this problem, for although *cephalus* is now shown to possess sufficient structural differences for specific separation, its status cannot be verified owing to the absence of detailed collections from the *cephalus-lineata* border-line areas. Also it is difficult to see the relationship of the Ardmore and Tilpa specimens, as they appear to be separated from the main *cephalus* population by a *lineata* population inhabiting practically the whole of the Northern Territory. Possibly there is a general overlap throughout the whole of the little known northern section of the Northern Territory.

TYMPANOCRYPTIS CEPHALUS GIGAS subsp. nov.

Form moderate to stout; head strongly depressed, much longer than broad with rounded canthus rostralis. Nostril oval, directed forward and downward; pierced in the upper half of an enlarged nasal which rests almost on the rostralis, making the nostril just visible when the head is viewed dorsally; nearer the eye than the tip of the snout. Upper head scales smooth becoming slightly tuberculate in the temporal region; 10–12 present between the supraciliary ridges and 6–7 separating the nasals; 6–7 scales separate the nasal from fourteen upper labials. Eye-lids larger and more prominent than in typical *cephalus*. Body strongly depressed; covered with non- or slightly imbricate heterogeneous scales; intermixed dorsally with clumps of spinous tubercles of the type figured. Ventral scales smooth. A strong gular fold present; angle of the mouth and axilla-groin folds absent. Limbs moderate; covered with mucronulately keeled scales; when adpressed the hind limb reaches to the tympanum depression. Sixteen and twelve spinous bicarinate lamellae under the fourth and third toes respectively. Preanal pores present, 1+1.

Colouration. Ground colour creamy-yellow; body traversed by four indefinite rich brown bands. Tail with ten transverse bands the first of which is very prominent. There are no upper head markings present and all ventral surfaces are white. A nape band is faintly present.

Measurements. Holotype male, S.A.M. R2434.

Total length: 156+ mm.

Body length: 39 mm.

Tail length: 95+ mm.

Head length: 22 mm.

Head width: 16 mm.

Fore limb: 28 mm.

Hind limb: 44 mm.

Distribution. This race is at present known from only a single locality, the extent of which is unknown, three specimens having been taken (separately ?) "between Ashburton and Gascoyne Rivers, Western Australia." Further collecting in this area may reveal it to inhabit the whole of this 2,000–4,000 ft. area including the Hamersley Ranges.

Loc. Western Australia: "Between Ashburton and Gascoyne Rivers" (holotype and two paratypes, S.A.M. R2434).

This race is founded on comparatively little data, as only three specimens from a single locality have been examined. However, the consistency of the diverse characters, together with the fact that the type and only known locality

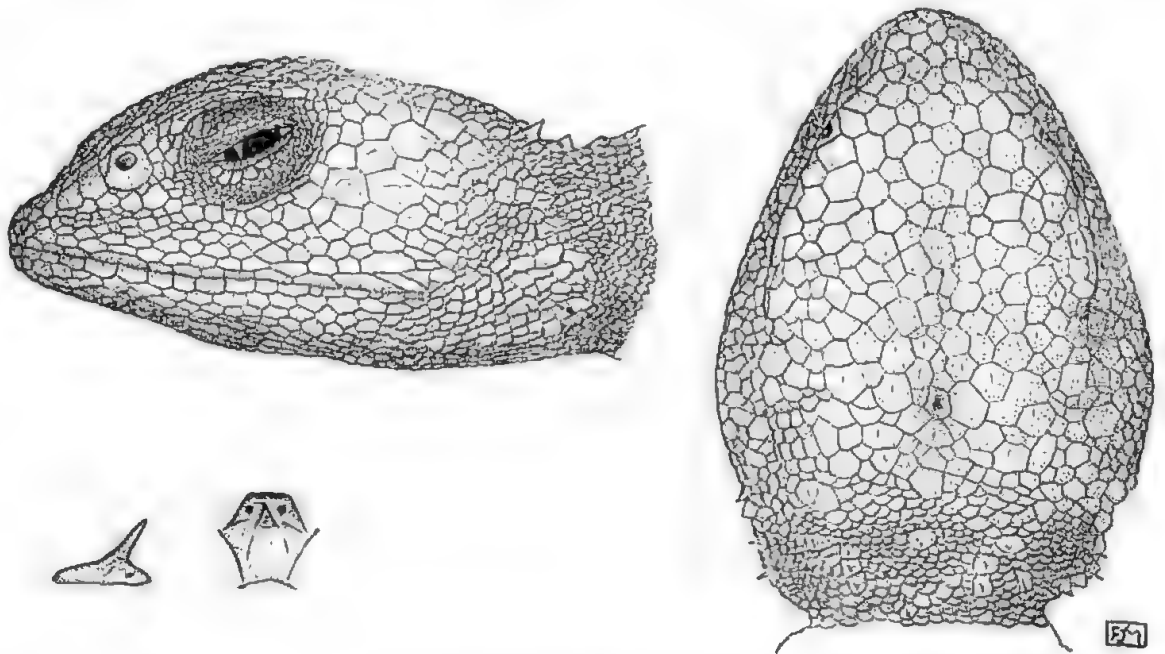


Fig. 4. *Tympanocryptis cephalus gigas*: dorsal and lateral views of the head ($\times 3$) and an enlarged dorsal tubercle ($\times 5$) of the holotype male.

is in the ecological upland niche of the Hamersley, Teano, Waldburg Range area, Western Australia (where many races, notably in Lepidoptera, have previously been found), have led to its tentative recognition as a subspecies. In a letter, Kinghorn, who kindly examined these specimens, suggested that they were merely fully adult specimens of typical *cephalus*. In an examination of all available specimens of the typical race, fully adult and pregnant females have been found to a maximum length of 122 mm. (A.M. R6243). The males are generally much smaller. The smallest of the three types measures 137 mm. and the largest 177 mm. The sculation differences and depression of the head and body are just as prominent in the smaller specimen as in the larger, and typical *cephalus* sculation is just as prominent in the 122 mm. female as in the smallest male.

Laterally, the conical spine which occurs dorsally, especially frontodorsally gives way to spines which are less prominent and directed forward, being in some cases slightly keeled and similar to those of *intima*. The tubercles, although in clumped formation, in no way exhibit the raised and rugose form as in the nominate race. The only colouration variation is the presence or absence of the dorsal blotches being present as an irregular cross-banding in the type and very faint to absent in the two paratypes.

TYMPANOCRYPTIS LINEATA LINEATA Peters.

Tympanocryptis lineata Peters, 1863, p. 230; Boulenger, 1885, p. 392; Lucas and Frost, 1896, p. 131.

Tympanocryptis lineatus Waite, 1929, p. 113.

Tympanocryptis lineata centralis Sternfeld, 1925, p. 234; Loveridge, 1934, pp. 325-326.

Form stout; head longer than broad with angulate supraorbital and canthal ridges. Nostril oval, directed forward and slightly downward; pierced in the upper half of an enlarged nasal shield just below the canthus rostralis, being midway between or slightly nearer the eye than the tip of the snout. Upper head scales strongly keeled, tuberculate and slightly spinous, there being 10-13 between the supraorbital ridges. Upper labials 12-16 with 4-5 rows of scales separating them from the nasal shield. Body strongly depressed, covered dorsally with heterogeneous scales the majority of which are strongly keeled; intermixed irregularly with large erectile strongly mucronate tubercles of the type figured; ventral scales smooth or slightly keeled, uniform and directed away from centre. A strong transverse gular fold present; a further strong fold of outstanding tubercles extends from the angle of the mouth toward the shoulder, thus making the neck appear wider, when viewed dorsally, than it actually is. In Northern and Central Australian specimens this fold is much weaker and the head narrows down more sharply at the neck. Axilla-groin fold absent. Limbs moderate, covered with slightly mucronate, strongly keeled scales; when adpressed the hind limb reaches to the tympanum depression or slightly less in some female specimens. Sixteen and ten to eleven spinous bicarinate lamellae under the fourth and third toes respectively. Preanal pores present, 1+1.

Colouration. Light grey-brown dorsally with two rows of chocolate brown quadrate spots, one on either side of the vertebral line, sometimes uniting to form transverse bands. Three longitudinal white lines are prominent, although often visible only where passing through the chocolate markings. In some specimens, notably those taken to the southward around Adelaide, the lines are continuous, the vertebral line running along a series of non-tubercular and often non-keeled

scales. Two light bands cross the head—a prominent one between the supraciliary ridges and another not so obvious and sometimes dispersed band across the nape. From above the posterior corner of each eye one arm of a chocolate chevron-shaped band extends toward the nape. This band is usually broken centrally. Ventral surfaces white with a few brown spots present on the gular and chest regions of some male specimens. The tail has twelve transverse chocolate bands,

Measurements. Adult male, S.A.M. R2417.

Total length: 109 mm.

Body length: 29 mm.

Tail length: 65 mm.

Head length: 15 mm.

Head width: 11.5 mm.

Fore limb: 20 mm.

Hind limb: 30 mm.

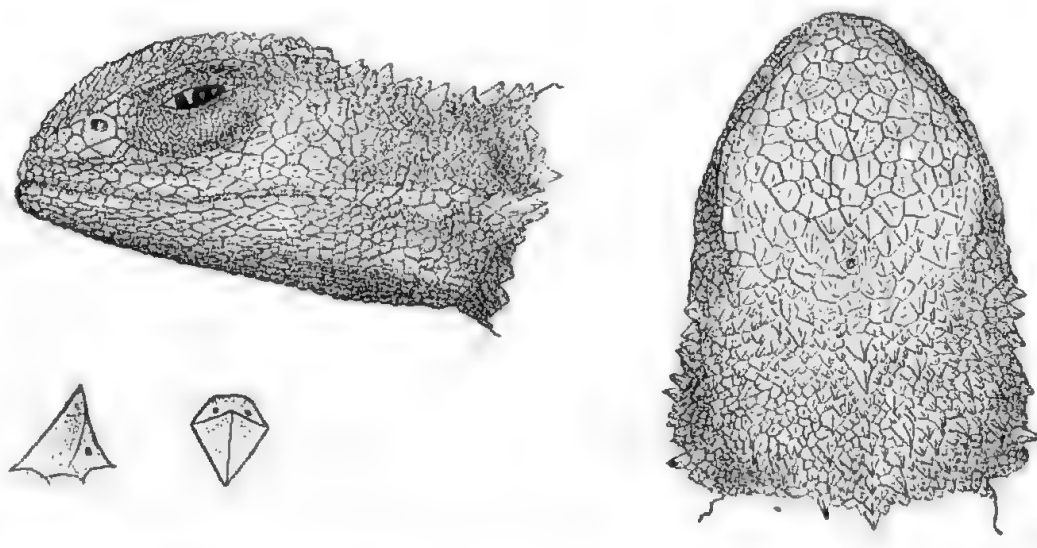


Fig. 5. *Tympanocryptis lineata lineata*: dorsal and lateral views of the head ($\times 3$) and a spinous dorsal tubercle ($\times 5$) of a typical specimen—S.A.M. R2417.

Distribution. Present locality records will not allow a detailed study of the distribution, but this form occurs most prominently throughout southern South Australia, being particularly common on the Nullarbor Plain. It also occurs northward around the *intima*, *maculosa*, *tetraporophora* distribution into the Northern Territory. A single specimen has been taken in the extreme south-west corner of Queensland and another at King's Sound in North Western Australia. Records have also been made of its presence near Mildura, Victoria, from which there is a gradual intergradation toward the Southern Victorian race *pinguicollis*.

Loc. South Australia: Buckleboo (S.A.M. R2417); Murat Bay (S.A.M. R2419); Sturt Creek (S.A.M. R2395); Hecctorville (S.A.M. R787); Hughes (S.A.M. R1017); between Oodnadatta and Todmorden (S.A.M. R591); Lake Callabonna (S.A.M. R2429); Adelaide (S.A.M. R2435); Blakiston (S.A.M.

R2438); Tumby Bay (S.A.M. R1857); Port Noarlunga (S.A.M. R2133); Wynbring (S.A.M. R875); Kingoonya (S.A.M. R988); Tarcoola (S.A.M. R1010); Koonibba (S.A.M. R1487); Sutherlands (S.A.M. R1517); Purnong (S.A.M. R553); Fifth Creek, Montacute (S.A.M. R2538); Kirton Point (S.A.M. 2539); Ooldea (A.M. R7666); Port Lincoln (A.M. R4904); South Australia (S.A.M. R1068, A.M. R5631, R5630); Central Australia (A.M. R2106, S.A.M. R2418). Northern Territory: Macdonald Downs (S.A.M. R1617); Coniston Station (S.A.M. R1694); Hermannsburg (S.A.M. R1535, R1559); Macdonnell Ranges (S.A.M. R319); Banka Banka Station (A.M. R12010-360). Queensland: Diamantina Creek (S.A.M. R1593). Western Australia: King Sound (M.M. R930).

Records have been made in South Australian Museum registration lists of specimens taken at Lake Phillipson, South Australia, and Mildura, Victoria. Loveridge (1934) had a specimen from Forrest, Western Australia, and Kinghorn (1945) records a specimen in a collection of *T. sutima* from 4 miles east of Camp 49, Simpson Desert Expedition.

There now seems little doubt that Peters used a specimen of this race in his type description. When dealing with the rare *Tiliqua adalaidensis* Peters, Waite (1929) cast some doubt on the locality data "Adelaide, South Australia," from which collection the type of *lineata* was also taken. In view of the fact that no further specimens of the *Tiliqua* had been collected in the sixty-five years that had elapsed since its description, Waite concluded that either the locality data was incorrect, or else *adalaidensis* had been described from a young specimen of one of the larger species. However, further specimens of this rare species have now been taken near Adelaide and a redescription is to be published later.

Considering the diversity of environment between the various habitats within the geographic range of this species the amount of variation is small. As already mentioned the degree of prominence of the angle of the mouth skin fold varies geographically, being most prominent in southern specimens and those transitional between *lineata* and the race *pinguicollis*. The tubercle shape is also fairly constant, although Northern Territory specimens have a much larger, more elongate tubercle form, with a blunter spine. The ventral and gular scales are keeled or smooth indiscriminately, both conditions occurring in specimens of the one sex taken together in a single collection.

With the exception of two specimens (S.A.M. R318) from the Northern Macdonnell Ranges, the colouration is also comparatively uniform, the greater majority of the specimens complying with the colour pattern already described. The outer-lateral white lines are generally absent, and there is some slight variation in the number of tail bands, the figure generally being twelve, but a range of 11-13 has been noted. Sometimes the bands are dispersed or united making a

greater variation, but specimens with an abnormal colour pattern have not been included in the variation recorded.

The above-mentioned Northern Macdonnell Range specimens have several peculiarities which suggest that a detailed examination of further specimens from this upland area may reveal the presence of a population worthy of recognition. These two specimens resemble typically coloured *tetraporphora* in the absence of longitudinal lines, and in having a light grey ground colour traversed by darker grey bands on the back and tail; also in the presence of 5-7 scales separating the nasal from the upper labials. They differ, however, in the much stouter habit and pores 1+1. The dorsal tubercles of these specimens are raised, but only bluntly keeled and non-spinous.

TYMPANOCRYPTIS LINEATA PINGVICOLLA subsp. nov.

Tympanocryptis lineata Lucas and Frost, 1894, p. 50; McCoy, 1889, p. 297, pl. 181.

Form stout with short robust limbs, the adpressed hind limb not reaching the shoulder; foot and digits stumpy, lacking the long thin narrow palm and fourth finger of the typical race; tail swollen at the base. Forelimb podgy with short thick digits; when adpressed forward barely reaches the tip of the snout. Head a little longer than broad with angulate supraorbital and canthal ridges. Nostril oval, directed sharply forward and downward; pierced in the upper half of an enlarged nasal, which is separated from fourteen upper labials by four rows of scales. Body depressed, covered dorsally and laterally with small rounded heterogeneous scales, the majority of which are sharply keeled; intermixed irregularly with very elongate wrinkled tubercles of the shape figured, these being more numerous than in typical *lineata*. In the extreme, the height of these tubercles is twice the basal length. Transverse gular fold present; angle of the mouth fold present or absent dependent on the state of the fat bodies—in the type it is absent, the neck being swollen out wider than the head, the only remaining indication of the fold being a row of tubercles which in *lineata lineata* is at the apex of the fold. Axilla-groin fold absent in the type, but strongly present in the majority of specimens. Limbs and tail short, covered with large keeled scales which tend to form uniform ridges. Gular and ventral scales uniform and smooth. Sixteen and ten spinous bicarinate lamellae under the fourth and third toes respectively. Pores small, almost indistinguishable, being partially hidden under the strongly imbricate ventrals—preanal only, 1+1.

Colouration of the type. Very badly faded owing to long preservation, but apparently near typical *lineata* colouration with very prominent dark edged, discontinuous vertebral and dorso-lateral lines; faint outer-lateral lines are

present. Without ventral markings. General ground colouration too badly faded to warrant description.

Colouration of a typical south-eastern Victorian specimen. Very similar to the typical race, but differing in the presence of outer-lateral white lines coinciding with the axilla-groin fold, and in the continuous nature of the dorso-lateral lines in the majority of specimens. The dark sinuous ventral mottlings on the chest and throat are more conspicuous.

Measurements. Holotype male, S.A.M. R2468a.

Total length: 115+ mm.

Body length: 43 mm.

Tail length: 54+ mm.

Maximum width of neck: 18 mm.

Head length: 18 mm.

Head width: 16 mm.

Fore limb: 22 mm.

Hind limb: 35 mm.

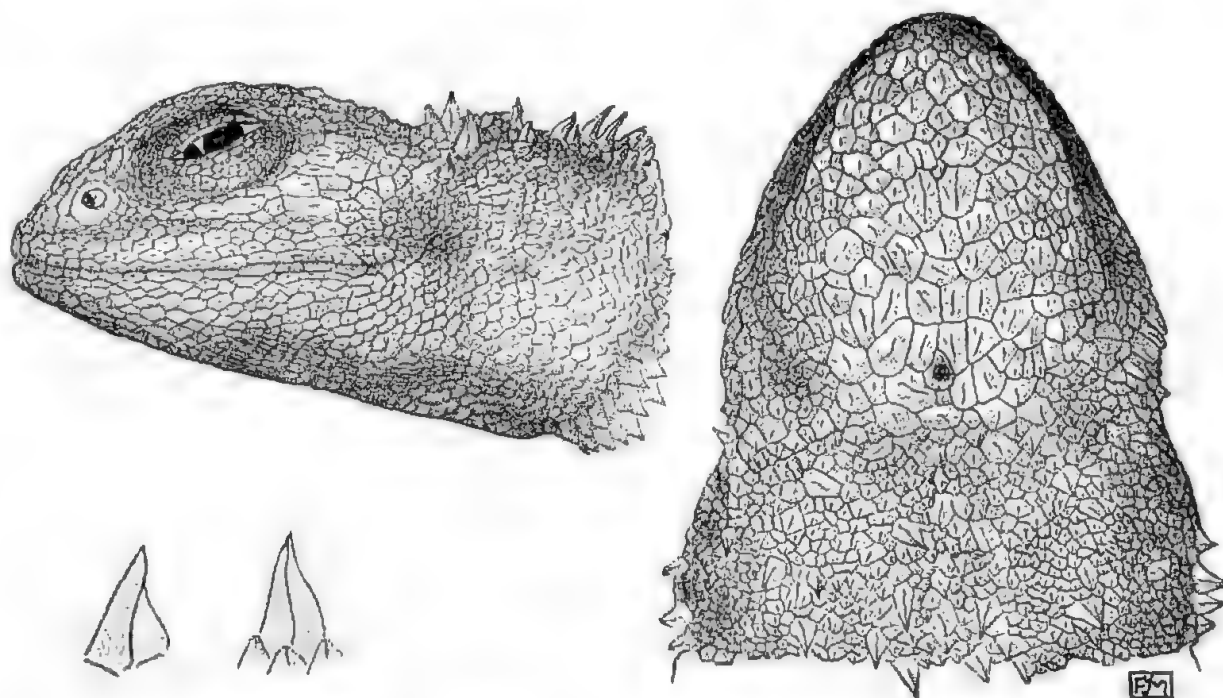


Fig. 6. *Tympanocryptis lineata pinguicollis*: dorsal and lateral views of the head ($\times 3$) and an enlarged dorsal tubercle ($\times 5$) of the holotype male.

Loc. Victoria: "Southern Victoria" (S.A.M. R2468, type specimens); Essendon (N.M. D1848, D1849, D7702); mouth of the Yarra River (N.M. D3482, D3483); Werribee (N.M. D1338, D1339); Victoria (A.M. R2054). New South Wales: Cooma (A.M. R3872).

Further Victorian localities recorded by Lucas and Frost (1894) under *lineata lineata* are Salt Water River, Maryborough and Rutherglen. Also recorded from Sunbury, Victoria, by McCoy (1889).

Owing to the large area of intergradation between this race and its nominate form, a detailed examination for variation is impracticable, the majority of specimens so far collected being at some stage intermediate between typical *lineata* and the extreme *pinguicolla*. It is not until southern localities around Melbourne are reached that any constancy is evident. The specimens here, although showing the very stout features, short limbs and elongate tubercle form, have not reached the extreme condition seen in the types. All specimens so far taken within a 100 mile radius of Melbourne have proved good and easily distinguishable examples, and can be regarded as typical of the race. The various characteristics of this subspecies are admirably shown in some excellent figures by McCoy (1889, pl. 181) of specimens taken near Essendon, Victoria.

Another prominent factor is the presence of an axilla-groin skin fold coinciding with the outer-lateral white line. This fold acts as an absolute division between the heterogeneous dorsal and the uniform ventral scales. In typical *lineata* this fold is absent, and the dorsal and ventral scales gradually intergrade. This fold is present in all specimens so far examined from the Melbourne area, and also in the two Australian Museum specimens from Cooma, New South Wales. It is, however, absent from the three type specimens. The thick neck, tail and body appear to have been caused by the building up of fat bodies, an X-ray examination having failed to show any skull modification to cause the abnormally thickened neck. It is probable that the colder prevailing conditions and more abundant food has led to the building up of fat storage to tide over the long winter in these southern areas. This fat storage suggests a reason for the inconstant presence of the skin folds, these being absent owing to contained fat early in the season, and present in specimens taken later in the season.

TYMPANOCRYPTIS LINEATA TETRAPOROPHORA Lucas and Frost.

Tympanocryptis tetraporophora Lucas and Frost, 1895, p. 265; 1896, p. 131.

Form moderate to slim; head almost once and a half times as long as wide; nostril round or slightly oval, directed forward and downward; pierced in an enlarged nasal just below an acute canthal ridge; nostril slightly nearer the anterior corner of the eye than the tip of the snout; separated from 15-17 upper labials by six or seven rows of scales. A minority of the upper head scales are tuberculate; 11-14 separate the supraciliary ridges. Body strongly depressed, covered dorsally with heterogeneous scales, the majority of which are feebly keeled; intermixed irregularly with elongate spinous tubercles of the form figured. A strong transverse gular fold present; angle of the mouth fold feebly present or absent, generally absent; axilla-groin fold absent. Limbs, as with the body and head, very elongate, and when adpressed the hind limb reaches to the eye or

beyond in males, and to the tympanum depression in females. Palm of foot very elongate with long digits, there being 19-21 and 12-14 spinous bicarinate lamellae under the fourth and third toes respectively. One femoral and one preanal pore present on either side in both sexes.

Colouration of the typical form. Ground colour grey-brown with the usual pairs of quadrate spots, which are sometimes fused to form dark grey, verging black cross-bands. No upper head markings. Tail with 12-14 transverse darker cross-bands. The dorso-lateral and vertebral lines are also present in many specimens as darker or lighter streaks. Under surfaces white; the chest and gular region in the male is often minutely dotted with brown.

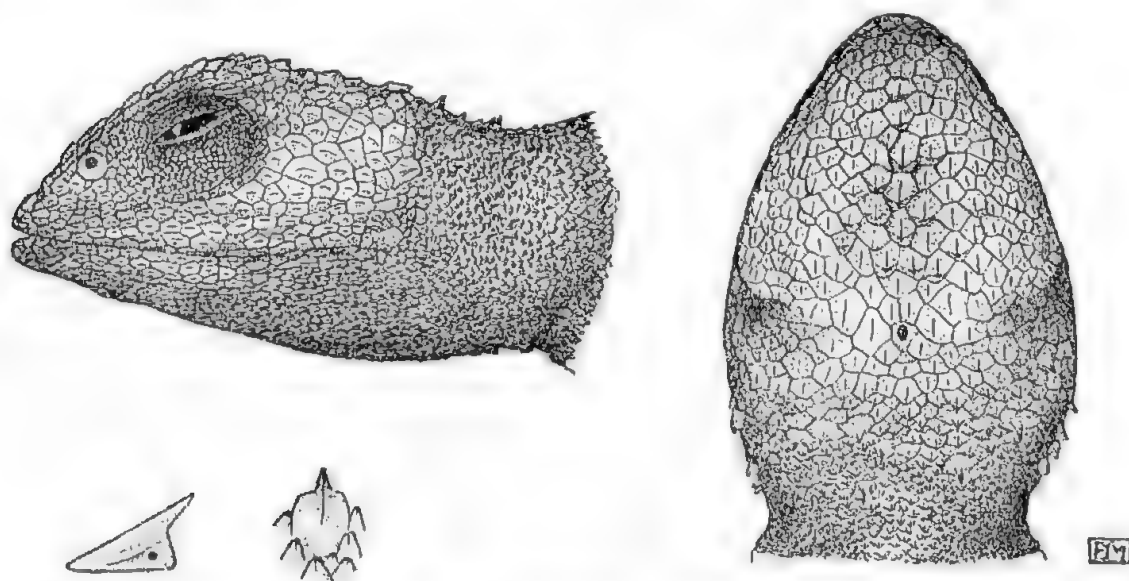


Fig. 7. *Tympanocryptis lineata tetraporophora*: dorsal and lateral views of the head ($\times 3$) and an enlarged dorsal tubercle ($\times 5$) of a typical male specimen—S.A.M. R2444.

Colouration of the Northern Flinders Range form. Dorsal and dorso-lateral surfaces uniform light grey without quadrate spots or longitudinal lines. Tail with 12-14 faint darker grey bands.

Colouration of small intermediary groups. These possess near typical *lineata* colouration with slightly smaller quadrate spots and additional tail bands. With the exception of the brilliantly coloured Southern Flinders Range specimens, whose colouration will be discussed later, specimens of these groups have no upper head markings.

Measurements. Typical male, S.A.M. R2444.

Total length: 152 mm.

Body length: 37 mm.

Tail length: 97 mm.

Head length: 18 mm.

Head width: 13 mm.

Hind limb: 43 mm.

Fore limb: 26 mm.

Distribution. Owing to the state of collection this is somewhat uncertain, but appears to be discontinuous throughout the greater part of Eastern and Southern Australia, and in some way correlated with the presence of hilly country.

Loc. South Australia: Abminga and Dalhousie (N.M. D7701); 20 miles north of Macumba Creek (S.A.M. R2444); Mt. Serle (S.A.M. R1285); Innaminka Hills (S.A.M. R2420); Northern Flinders Ranges (S.A.M. R2494, R2448); Indulkana Ranges (S.A.M. R590); Marree (S.A.M. R212); near Marree (S.A.M. R2449); Mern Merna (S.A.M. R2605); Warcowie (S.A.M. R2580); Finnis Springs (S.A.M. R2525, part); 4 miles south-west of Marree (S.A.M. R2598, part). Central Australia: (N.M. D5397, D5398, S.A.M. R2428, A.M. R2107, R4883, R4885, R4886, R2108). Northern Territory: Charlotte Waters (N.M. D3485, D3484). Queensland: Hughenden (A.M. R10108, R10107, R10106); 15 miles south-west of Urandangi (A.M. R10306.17); Wangarie Richmond (A.M. R5000); Muttaborra (A.M. R3336); 8 miles west of Winton (A.M. R10308). Western Australia: Eyre Sand Patch, Hampton Range (S.A.M. R2415). New South Wales: Broken Hill (A.M. R9833, S.A.M. R2425); Silverton (S.A.M. R2500); Moree (A.M. R1828); Darling River (A.M. R5650).

The reinstatement of this form rests upon a detailed examination of all available four-pored specimens and their habitats. The conclusion is that this group is worthy of recognition taxonomically, and that the additional pores and other factors are not individual variations as was apparently suspected by Lucas and Frost (1896). Other characters correlated with the additional pores tend to verify this conclusion. It has been found that all specimens with four pores have:

- (a) a very elongate form.
- (b) a constant position for the nostril, this differing from that of *lineata lineata* in having a greater number of scales separating it from the upper labials.
- (c) a comparatively constant and definite tubercle shape.

Further, all specimens with the additional pores have been taken in a hilly environment. Thus we have a series of localities all involving hills or ranges. Lucas and Frost doubted the validity of their *tetraporophora*, principally on the grounds of colour variation, as some specimens had been found with colouration closely resembling that of *lineata lineata*. It is evident now that the colouration varies not only from population to population, but also within a single population in the case of large areas where there is an appreciable environment or altitude change. In the two main distributional areas, viz., the Flinders Ranges and the

Abminga-Dalhousie-Indulkana Range areas, such conditions are present. It is probable that as further specimens are collected from the western slopes of the Great Dividing Ranges in Queensland and New South Wales, that such a condition will be found there also; specimens from Hughenden, Queensland, exhibit colouration more uniform and drab than those taken from further out at Richmond and Winton in the same State.

The type and other specimens from the Abminga-Dalhousie area have typical colouration as already described, while specimens taken on the outskirts of the area delineated, are at intermediate stages between this and typical *lineata* colouration.

Such specimens of the Horn Expedition material as are available have been examined, and all have been found to be intermediatarily coloured *tetraporophora*, although Lucas and Frost (1896) recorded three localities within the apparent range of *tetraporophora* from which "typical" *lineata* were taken. The examined Horn specimens are without accurate locality data, and it is not possible to determine which, if any, of them were regarded by Lucas and Frost as "typical" *lineata*. It is possible that they did not critically examine their specimens for the additional pores and because of their colour assumed them to be *lineata lineata*. This is supported by the fact that in many female specimens the additional pores cannot be distinguished with the unaided eye, and without microscopic examination it would have been logical to conclude that a specimen of this nature, with typical *lineata* colouration was *lineata lineata*. Again, one of the localities from which Lucas and Frost recorded typical *lineata* is the type locality of *tetraporophora*, viz. Dalhousie. This indicates either definite overlap in distribution or else pronounced interbreeding between the two forms, if these specimens were only bi-pored.

A similar combination of characters is found in examples from the Flinders Ranges, South Australia. A number of specimens taken near Mt. Serle, have a uniform drab colouration of dull grey which is unbroken by longitudinal lines or quadrate spots, the only variation being faint caudal banding. From the Southern Flinders Ranges several excellent collections have been received from the vicinity of Mern Merna and Warcowie. These consist entirely of four-pored specimens, all of which have a brilliant and unique colour pattern even more striking than typical *lineata* colouration. The dorso-lateral white lines extend to the neck and on to the head, the outer-lateral lines being present and prominent, continuing along the cheek in many specimens. The dorso-lateral lines are unbroken and expand on reaching the nape to about twice their original width, extending along the head to a position above and just behind the eye. The vertebral white line also extends to the nape, but does not dilate appreciably, nor does it reach as far as the outer-lateral lines; there are no further markings

on the head. In some specimens exhibiting a brick-red ground colour the dorso-lateral lines have darkened to a dull grey, although they are still prominent.

Although the scalation and proportion of all populations are approximately constant, it can be seen from the above that the major isolated populations have developed some colour peculiarities. The smaller populations inhabiting low hills where there is little variation in environment, have a uniform colour pattern closely resembling that of *lineata lineata*, although generally lacking the upper head markings. Such populations occur at Hampton Range, Western Australia; Hermit Range, South Australia; Barrier Range, New South Wales; Urandangi area, Queensland, etc. A single specimen, said to have been taken in the Innaminka Hills, South Australia, has a uniform colouration resembling that of the Northern Flinders Range specimens.

It is difficult to decide the status of this group until its position has been analyzed in the field. Considering only its structural resemblance it has been placed as a race of *T. lineata*. Critically there are almost equal grounds for placing it with either *cephalus* or *lineata*, for it exhibits definite affinities with both. The position of the nostril and the number of scales separating it from the upper labials are definitely near *cephalus*, while the general form, colouration and to some extent scalation point to a relationship with *lineata*. As will be discussed later, a possible explanation to its affinities with both species is that it is an ancestral form.

The association of this race with *lineata* was influenced principally by the fact that if it was discontinuously isolated by interbreeding, as present evidence suggests, then it can only interbreed with its present surrounding populations of *lineata*. To have any direct connection with *cephalus* under these circumstances, *cephalus* would have to be regarded as a race of *lineata*, a doubtful assumption on recent distributional evidence.

The suggestion is made that the four-pored material represents an archaic and at present static race, which is existing in small ecological niches in and around hill and range country, where the open plain dwelling *lineata lineata* is less likely to encroach on it. This is supported by its present ecologically diverse distribution with little somatic change.

TYMPANOCRYPTIS UNIFORMIS sp. nov.

Form very stout; head almost as wide as long; the angular canthus rostralis together with the flat dorsal surface of the snout, give the head a "sliced" appearance. Nostril oval, directed forward and downward; pierced in the upper half of a slightly tubular nasal shield, being a little nearer the tip of the snout than the eye. Upper head scales only slightly enlarged, flat, and keeled; about

sub-equal in size to the enlarged dorsal scales. Body stout and not markedly depressed; covered dorsally and laterally with keeled heterogeneous scales. No enlarged dorsal tubercles, their place having been taken by simple mucronately keeled scales, which are but slightly raised above the normal dorsals, being little noticed without critical examination. Several small conical tubercles are present on the nape. Ventral and gular scales feebly keeled. Limbs short and weak; when adpressed the hind limb reaches to the shoulder. The tail is short and

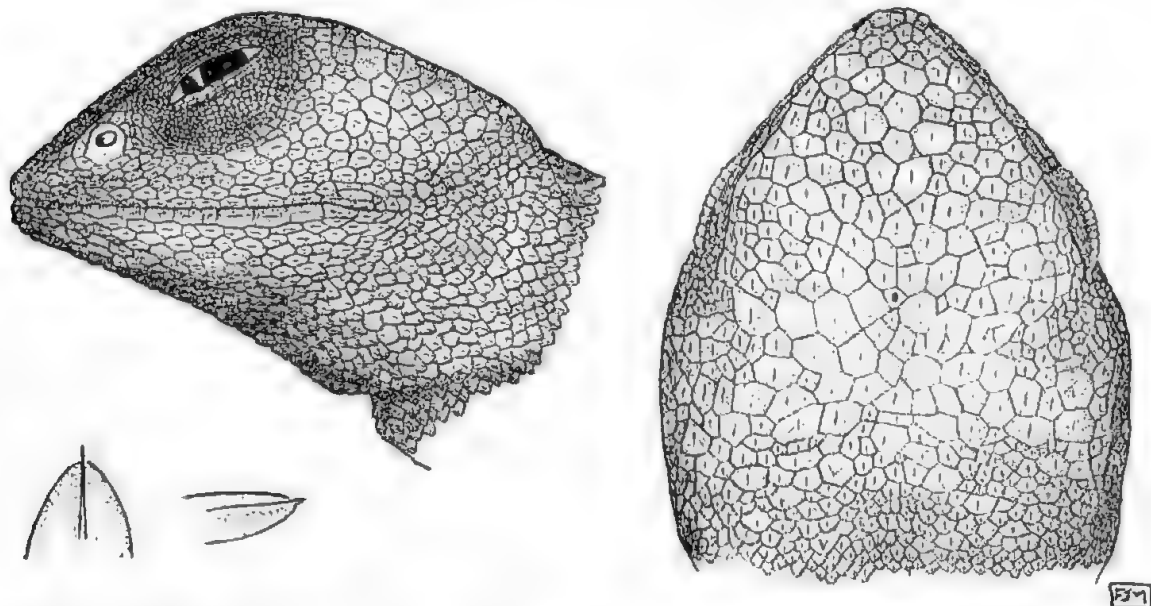


Fig. 8. *Tympanocryptis uniformis*: dorsal and lateral views of the head ($\times 3$) and an enlarged dorsal scale ($\times 5$) of the holotype specimen.

tapers rapidly to a fine point, its length being a little longer than the combined head and body measurements. A strong transverse gular fold is present while the angle of the mouth fold and its attendant tubercles are absent; axilla-groin fold absent. Preanal pores 1+1, barely visible. Sixteen and nine bicarinate and strongly spinous lamellae under the fourth and third toes respectively. The eyes protrude beyond the supraciliary ridges, making the upper and lower eyelids very convex.

Colouration. Somewhat faded in spirit, but apparently a uniform blue-grey dorsally and dirty white ventrally, both surfaces lightening posteriorly. There are faint indications of transverse caudal banding.

Measurements. Holotype, S.A.M. R705.

Total length: 114 mm.
Body length: 33 mm.
Tail length: 65 mm.
Head length: 16 mm.

Head width: 15 mm.
Fore limb: 25 mm.
Hind limb: 33 mm.

Distribution. The type and only specimen was taken near Darwin, Northern Territory, by P. Wesselmann, June, 1911.

To date this peculiar lizard is the stoutest form described, and its squat rotund body, short tail and limbs, together with the relatively uniform scalation, contrast sharply with the other strongly depressed and irregularly scaled members of the genus.

TYMPANOCRYPTIS MACULOSA sp. nov.

Form moderate, head short; nostril below an ill-defined canthus rostralis and slightly nearer the tip of the snout than the anterior corner of the eye; pierced centrally in an enlarged nasal, which is separated from fifteen upper labials by 3-4 rows of scales; the actual nostril aperture is a slit in the bottom of an oval nasal cavity, being directed just forward of vertically downward. Dorsal and

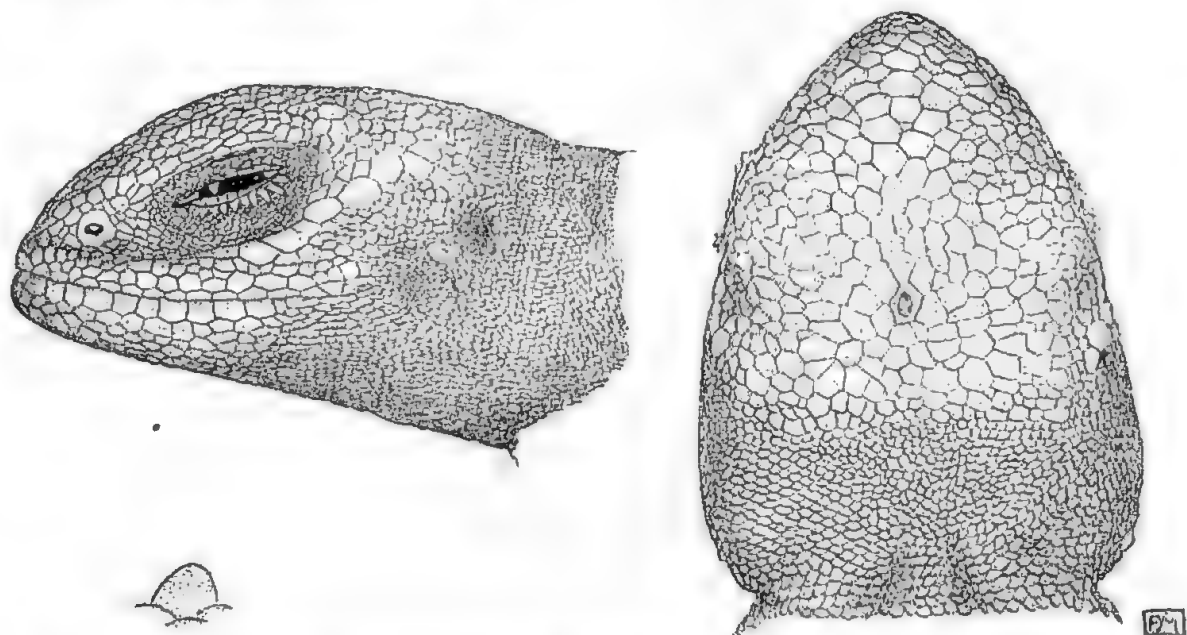


Fig. 9. *Tympanocryptis maculosa*: dorsal and lateral views of the head ($\times 3$) and an enlarged dorsal scale ($\times 5$) of the holotype male.

lateral scales smooth, non-imbricate and heterogeneous, being intermixed with slightly enlarged flat plates, which become weakly tuberculate laterally. Ventral scales smooth and uniform, slightly imbricate, directed away from centre; gular and anal scales small, tending granular; caudal scales show slight keels toward the tip of the tail. Upper head scales flat and smooth, 18-20 between the supra-ciliary ridges. The adpressed hind limb reaches to the tympanum depression which is very prominent. A strong transverse gular fold is the only skin fold present. Another prominent feature of this species is a row of enlarged tubercular scales which extend from under the eye to above the tympanum depression.

Six femoral pores on either side including one in each groin; a single pore is present just within the preanal region in the holotype specimen; extending almost the full length of the thighs. In the female allotype the pores occur as minute depressions in modified scales. Eighteen and eleven unicarinate spinous lamellae under the fourth and third toes respectively.

Colouration. Dorsal surface white to very pale grey with a row of five very dense black blotches on either side of the vertebral line; the two rows coalesce toward the tail; a few small spots are also present along the vertebral line. Ventral surfaces white; a black streak extends longitudinally along the centre of the throat as far as the gular fold. The black markings are less pronounced in the allotype female.

Measurements. Holotype male, S.A.M. R2220a.

Total length: 135 mm.

Head width: 15 mm.

Body length: 55 mm.

Fore limb: 27 mm.

Tail length: 80 mm.

Hind limb: 38 mm.

Head length: 19 mm.

Distribution. Twenty specimens of this unusual species were taken by the late Dr. C. T. Madigan in his expedition on to the surface of Lake Eyre North, in August to December, 1929. In his report he mentions them as occurring on the four mile wide marginal area of the lake.

Loc. South Australia: Lake Eyre North, holotype, allotype and paratypes, S.A.M. R2220.

This unique species is one of the most specialized Australian lizards and is an excellent illustration of selective adaption to a special environment. In this barren habitat one immediately wonders as to the food of these lizards. An examination of the stomach contents has revealed it to consist mainly of small harvest ants (*Melophorus* sp.) which apparently feed on the numerous seeds which are blown out over the lake, or alternatively, as was suggested by Madigan (1930), on micro-organisms in the salt. The seeds also appear to have formed some part (accidental or otherwise) in the diet of the lizards, as several of the stomach contents examined, contained seeds in various stages of digestion. Another query which introduces itself is that of shelter on this flat non-vegetative plain, but Madigan mentions in his report that the lizards were found burrowing in dry sand deposits and under the buckled salty crust.

In the above-mentioned report (Madigan, 1930), these lizards were identified as *Tympanocryptis lineata* var. by Mr. H. M. Hale, present Director, South Australian Museum. Hale, although pointing out the unique colouration and smooth scalation, did not note one other important difference, viz. the presence of a series of femoral pores. This, together with the scalation and colouration

differences already enumerated, are ample grounds for its complete specific separation.

As with the majority of species in this genus, the specimens of this species so far examined show remarkably uniform characters, the only variation worthy of notice being that in some specimens, the "enlarged" plates are so nearly subequal to the normal dorsals that their presence can be disregarded. The only colour variation is the less prominence of the darker markings in female specimens.

TYMPANOCRYPTIS LINEATA CENTRALIS Sternfeld.

As already noticed by Loveridge (1934) the grounds upon which Sternfeld based this race are slender, his principal distinguishing feature being the greater relative length of the tail, which in his type is 1.7 times the snout-vent length, as against 1.1 times in a specimen of *lineata*, the measurements of which were given by Boulenger (1885). The average ratio of typical *lineata* specimens is approximately 1.5, which would be about equal to the average for the eight co-types of *centralis*. According to Loveridge (1934) the figure for these is 1.2-1.5 in the females and 1.5-1.6 in the males.

In response to a request, the British Museum authorities kindly checked the measurements of Boulenger's specimen, and this revealed that the tail was probably incomplete. It is interesting to note that the ratio for a second specimen in the same collection whose measurements were also provided is 1.5.

An examination of six specimens from the Hermannsburg district has supplied no further support for the formation of this race. All six specimens have typical *lineata* scalation, and specimens taken near the mission station itself have typical colouration. Specimens taken to the north of Hermannsburg toward the Macdonnell Ranges, however, have less prominent dorso-lateral lines, and the quadrate spots tend to form transverse bands. A specimen of this nature may have been described by Sternfeld as a type. In these six specimens the snout-vent into tail ratio averages 1.6.

Loveridge (1934) mentions one other character in connection with *centralis*, viz. the presence or absence of keeled ventral scales. This has been found very inconsistent, the two conditions often being found in specimens of the same sex taken in a single collection.

KANGAROO ISLAND RECORDS.

In his British Museum Catalogue, Boulenger records a specimen of *Tympanocryptis* from Kangaroo Island, South Australia (B.M. Reg. No. 56.1.9.6). In reply to a request for further information the British Museum authorities stated that they had no further data other than that the specimen was presented by the

Zoological Society of London. Other than this one record, no others have been made for the genus on this or any other insular area about Australia and I am inclined to consider that there has been some confusion with regard to the locality of this specimen.

In 1927 the Fauna and Flora Board of S.A. made a survey of the fauna of Kangaroo Island and were also unable to locate any further specimens, Waite in his report (1927) merely referring to the British Museum Catalogue record. In January of the following year, soon after completing the manuscript of his Reptile Handbook, Waite died. Unless he obtained further records for the genus between October, 1927, and his death, the reference in his handbook to *T. lineata* as "not uncommon on Kangaroo Island" appears to be a generalization based on the single British Museum record.

PROPORTIONAL ELONGATION.

During the preliminary hunt for concrete distinguishing factors it was thought that the elongation of some forms may have been accompanied by some increase in vertebrae numbers. Consequently a small number of each were X-rayed. As a result it was found that there was no difference in the number of body vertebrae, the only variation being in the proportions of each component. The number appears to be constant at 22-24, generally 23. The tail vertebrae, however, vary considerably, 42 being about the average, but some specimens of *tetraporophora* have 50, while in some of the shorter tailed species *cephalus* and *uniformis* the count falls to 35. The actual ranges are: *cephalus* and *uniformis*: 35-40, average 38; *lineata* 38-44, average 42; *tetraporophora* 41-50, average 46; all other forms have a range between 38 and 45.

With regard to the proportion change of the individual body vertebrae, this is only noticeable in the extreme forms *cephalus* and *tetraporophora*. In *cephalus* a standard vertebra is almost once and a half times as wide as long, while in *tetraporophora* it is slightly longer than wide. The tenth vertebra in each case is taken as standard.

Another significant feature noticeable in the X-ray is the elongation of the skull and its consequent modification. The best diagnostic feature here revealed is the angle at which the lower jaws set themselves when closed. Here again the difference is only significant in the extremes. In *tetraporophora* it varies between 50° and 55°, while in *cephalus* it ranges from 60° to 65°. In the single specimen of *uniformis* it is about 70°.

This skull elongation, which can be taken as a representative factor in the general elongation of the whole animal, is shown graphically in the form of a

series of histograms (fig. 10). The three divisions of *tetraporophora* which overlap *lineata* are composed almost entirely of the small Southern Flinders Range group. Where there are sufficient specimens of the other forms it is apparent that they are all near *lineata* in this respect.

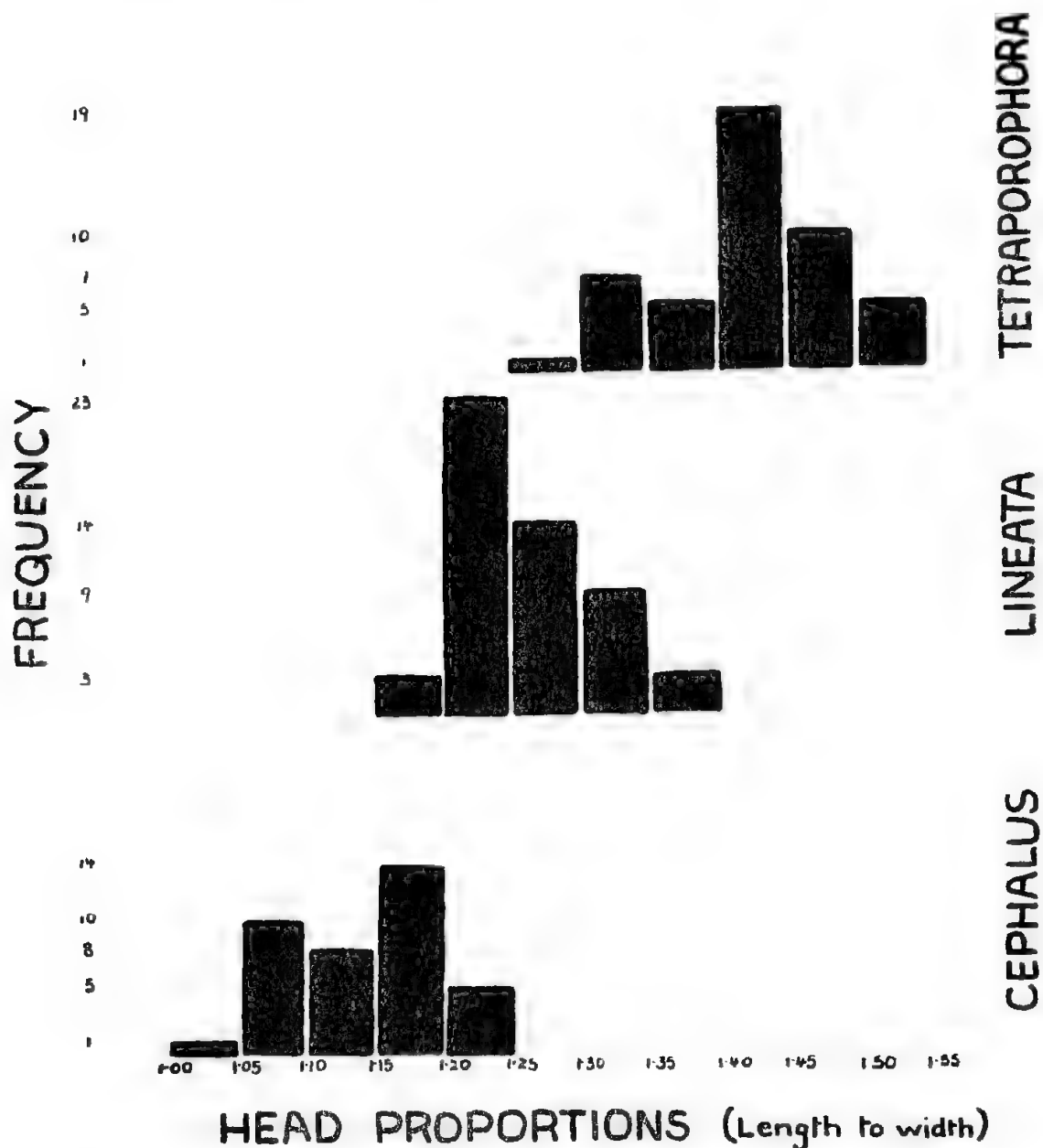
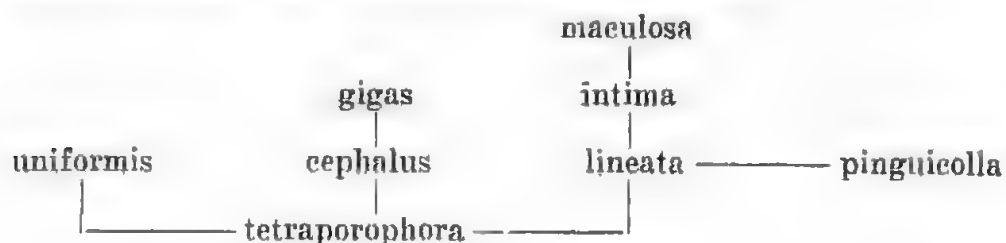


Fig. 10. Proportional elongation: the above results illustrated graphically in the form of a series of histograms.

RELATIONSHIPS.

Owing to the present incomplete knowledge of the distribution of many forms of the genus, the relationships cannot be determined with finality. Having regard to the geologically recent drying of Lake Eyre North and the Age and Area Hypothesis it would seem possible that the last species to become established was *maculosa*. By comparison with other forms it appears to be a modification or mutant of *intima*, the species which at present completely surrounds it, there being an apparent trend toward a reduction in the number and size of the enlarged tubercles and keels through *lineata* and *intima* to *maculosa*.



It is suggested, on available evidence, that a form resembling the present *tetraporophora* became differentiated into three species, viz. *cephalus*, *uniformis* and *lineata*. Further that *cephalus* has given rise to one race *gigas*, while two species and one subspecies are modifications of *lineata*. As has already been pointed out in the previous discussion on *tetraporophora*, the last named shows definite affinities with two of these possible major evolutionary chains—that of *lineata* and of *cephalus*. This further supports the hypothesis of both having arisen from a population closely akin to *tetraporophora* as at present recognized.

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TABLE OF THE STRUCTURAL DIFFERENCES.

Race	Dorsal Scales.	Ventral Scales.	Tubercle Shape	Pores.	Relative proportions	Tubercle Distribution.	Labial from Nasal separation.	Angle of Mouth Skin Fold.	Axilla-groin Skin Fold.	Tail Bands.
<i>lineata</i>	Majority strongly keeled	Feebly keeled or smooth	Vertically spinous	Prealal, 1+1	Moderate to stout, strongly depressed	Numerous, irregular, singly distributed	4-5 rows	Strongly present in majority of specimens	Absent	12-13
<i>uniformis</i>	All keeled	Keeled	Flat with simple keel	Prealal, 1+1, very small	Very stout	Flat and not noticeable without critical examination	4 rows	Absent	Absent	10 or 11, very faint
<i>pinguicolla</i>	Majority keeled	Feebly keeled or smooth	Very elongate, vertically spinous	Prealal, 1+1, very small	Stout, strongly depressed	Very numerous, irregular, singly distributed	4 rows	Present or absent when swollen	Strongly present	12
<i>intima</i>	Smooth	Smooth	Flat and spinous	Prealal, 1+1	Stout, depressed	Sparse, tending to form four longitudinal series	4-6 rows	Feebly present	Absent	10-12, often absent or dispersed
<i>maculosa</i>	Smooth	Smooth	Flat and smooth	Femoral, 5+5 average	Stout, depressed	Not noticeable without critical examination	3-4 rows	Absent	Absent	Absent
<i>tetra-porphora</i>	Feebly keeled or smooth	Smooth or feebly keeled	Raised and spinous	Femoral, 1+1 preanal, 1+1	Slim to moderate, strongly depressed	Numerous, irregular singly distributed	6-7 rows	Absent or feebly present	Absent	12-15
<i>cephalus</i>	Smooth	Smooth	Rugose, tending conical, slightly spinous	Prealal, 1+1	Stout, body strongly depressed	Numerous, irregular, distributed in clumps of two or more adjacent	6-7 rows	Absent or very feeble	Absent	8-10
<i>gigas</i>	Smooth	Smooth	Flat, with conical spine rising just forward of centre	Prealal, 1+1	Stout, very strongly depressed	Numerous, irregular, distributed in clumps of two or more adjacent	6-7 rows	Absent	Absent	8-10

EXPLANATION OF PLATES.

Plate iv.

- Fig. 1. Holotype male of *Tympanocryptis lineata pinguicolla*.
Fig. 2. Typical male of *Tympanocryptis lineata lineata*—S.A.M. R2417.
Fig. 3. Holotype female of *Tympanocryptis intima*.
Fig. 4. Holotype specimen of *Tympanocryptis uniformis*.

Plate v.

- Fig. 5. Holotype male of *Tympanocryptis cephalus gigas*.
Fig. 6. Co-type specimen of *Tympanocryptis cephalus cephalus*.
Fig. 7. Typical inland male of *Tympanocryptis cephalus cephalus*—W.A.M. R7067.
Fig. 8. Holotype male of *Tympanocryptis maculosa*.

Plate vi.

Tympanocryptis lineata tetraporophora.

- Fig. 9. Typical form.
Fig. 10. Low hill form.
Fig. 11. South Flinders Range form.
Fig. 12. North Flinders Range form.